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Shared Knowledge and Peano's Formulario*

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CHARACTERIZING A MATHEMATICAL SCHOOL: SHARED KNOWLEDGE AND PEANO'S *FORMULARIO*

ERIKA LUCIANO

ABSTRACT. — This article is devoted to a re-interpretation of the activity of the Peano school linked to the *Formulario di Matematica*, a text that has always been presented as the manifesto par excellence of this group. The choice of a new perspective, buttressing the analysis of this encyclopaedic work with that of the exchanges among the Peanians—reconstructed thanks to new archival sources—has made it possible to replace the clichés produced by historiography and to recover and properly attribute to Peanians a substantial mass of results in logic and foundations of mathematics, which circulated in the school but without ultimately filtering into the *Formulario*. A stark contrast emerges between the usual image of the Peano school (that of a cohesive, hierarchically structured team) and the real practices of collective construction and socialization of mathematics within a network of scholars much looser than one might expect.

RÉSUMÉ (Caractériser une école mathématique : le *Formulario* de Peano et les échanges de savoir)

Cet article vise à réinterpréter l'activité de l'école de Peano liée à l'édition du texte qui en est généralement considéré comme le manifeste : le *Formulario di Matematica*. Nous proposons d'analyser cette collection encyclopédique à la lumière des échanges entre les membres de l'école de Peano que de nouvelles sources nous ont permis de mettre au jour. Cette nouvelle perspective nous

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amène à porter un regard critique sur l'historiographie de l'école de Peano et à mettre en évidence que de nombreux résultats sur la logique et les fondements des mathématiques ont circulé au sein de cette école sans pour autant se voir publiés dans le *Formulario*. L'image qui a souvent été donnée de l'école de Peano comme présentant une grande cohésion et une forte structure hiérarchique contraste profondément avec la réalité des pratiques collectives de construction et de socialisation du savoir mathématique au sein d'un groupe qui s'avère beaucoup moins rigide qu'on aurait pu l'attendre.

1. INTRODUCTION

The aim of this article is to prove that the interpretive category 'mathematical school' can be applied to what is commonly identified as the 'Peano school' only in a partially coherent way. The approach taken here, which for the first time explicitly traces the exchanges that took place in this group, permits a more complete and nuanced vision of its research and publication practices. In particular, it allows us to:

(1) clarify and explore Giuseppe Peano's leadership and his influence on his students, colleagues and collaborators (to whom we refer collectively as 'Peanians' for convenience) in greater detail, both with regard to his scientific mastery and his authoritarian tendencies;

(2) replace the cliché produced by 19th and 20th-century historiography of the perfect harmony within the Peano school with a more accurate description of the professional and personal relationships of a team, sometimes inevitably in conflict;

(3) prove that the encyclopaedic treatise *Formulario di Matematica*, usually considered the manifesto of this school, did not in fact serve as such;

(4) recover and properly attribute to Peanians of greater or lesser prominence a substantial mass of results, which circulated in the school but without ultimately filtering into the *Formulario*.

The present paper is organized as follows.

First we will examine what is generally meant in the literature by the term Peano school (sometimes also known as the Italian school of mathematical logic), illustrating its structure, aims and project (§ 2).

Next we will focus on the *Formulario*, a text that has always been presented as the result par excellence of teamwork in the Peano school (§ 3 and 4). Taking this treatise as a touchstone, a stark contrast emerges between the image of the Peano school delivered by historians (that of a cohesive, hierarchically structured team) and the facts (a loose network of

scholars, often inclined to work individually, even without informing the *Maestro* and their colleagues about their studies) (§ 5).

In light of this new depiction, a new problem arises: that of tracing the important body of knowledge that was collectively built by the Peano school, but was not completely recorded in the *Formulario* (§ 6.1 and 6.2). The contents of the exchanges that occurred among the Peanians, in the years of their “feverish creativity,”¹ can now be reconstructed thanks to a variety of archival sources, recently discovered (§ 7.1 and 7.2).

To document the transition (full or partial, permanent or of limited duration) from a local, mainly oral culture, to a written work intended to be authoritative and even definitive, as was the *Formulario*, we have chosen four examples, related to the area of foundational studies (§ 8.1–4).

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2. THE CLICHÉS ABOUT THE PEANO SCHOOL

Guido Castelnuovo [1930, p. 615] described the notion of ‘school’ in a famous passage:

a scientific school [is] a union or a family of people collaborating in developing and pursuing a well-defined project of research. [...] In scientific respects it offers the means of accelerating and deepening the exploration of a given field, penetrating every facet of it, illuminating it from various perspectives. But the school also brings advantages for individuals, since it makes it possible to exploit in the most effective way the various aptitudes, and also to make the most of the work of mediocre scholars [...]. Now, to create a school the merit of the *Maestro* is not sufficient, nor is it sufficient that he knows how to outline a vast plan of research projects that go beyond his own working capacity. It is also necessary that he succeeds in communicating his passion and his faith to his disciples and in demanding and directing their collaboration.²

¹ AVM: A. Padoa to G. Vailati, 5.9.1901.

² Una scuola scientifica [è] una riunione o direi quasi una famiglia di persone collaboranti nello sviluppare e proseguire un piano organico di ricerche. [...] Nei